

SOLAR OBSERVATIONS

SOLAR AND SKY RADIATION MEASUREMENTS DURING AUGUST, 1928

By HERBERT H. KIMBALL, Solar Radiation Investigations

For a description of instruments and exposures and an account of the method of obtaining and reducing the measurements the reader is referred to the REVIEW for January, 1924, 52:42; January, 1925, 53:29, and July, 1925, 53:318.

Table 1 shows that solar radiation intensities averaged above normal values for August at all three stations.

Table 2 shows that the total solar radiation received on a horizontal surface directly from the sun and diffusely from the sky was above the August normal at Madison and Lincoln and below the normal at Washington.

Skylight polarization measurements made at Washington on seven days give a mean of 52 per cent, with a maximum of 54 per cent on the 13th. At Madison measurements made on seven days give a mean of 67 per cent with a maximum of 77 per cent on the 31st. These are close to the corresponding average values for August at Washington and considerably above at Madison.

TABLE 1.—Solar radiation intensities during August, 1928

(Gram-calories per minute per square centimeter of normal surface)

Washington, D. C.

Date	Sun's zenith distance										Local mean solar time	
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°		
	75th mer. time	Air mass										
		A. M.					P. M.					
		e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0		5.0
mm.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mm.		
Aug. 2	17.37				0.82	1.17					18.59	
Aug. 3	17.37				0.88						19.89	
Aug. 6	17.37				0.97	1.25					16.78	
Aug. 13	10.59				1.41			1.03			9.14	
Aug. 14	11.81	0.73	0.84	0.98	1.12	1.34	1.12				13.13	
Aug. 18	18.59				0.66						18.59	
Aug. 20	14.10	0.63	0.74	0.86	1.03						12.24	
Aug. 21	12.68	0.59	0.68	0.79	0.90						14.10	
Aug. 28	19.89				1.07						18.59	
Aug. 29	19.23	0.48	0.56	0.65	0.80	1.07					20.57	
Aug. 30	20.57		0.56	0.69	0.88	1.18					18.59	
Means		0.61	0.68	0.79	0.91	1.24 (1.12)	(1.03)					
Departures		-0.03	+0.01	+0.05	-0.01	+0.01	+0.10	+0.15				

Madison, Wis.

Aug. 10	16.20				1.07	1.42					14.10
Aug. 11	10.59				1.07	1.24					10.21
Aug. 13	11.38				1.13	1.35					12.24
Aug. 14	10.59				1.04	1.25					13.13
Aug. 18	11.38				1.15	1.36					11.38
Aug. 21	12.68				1.40	1.24					9.53
Aug. 22	9.83		0.94	1.05	1.18	1.40					9.14
Aug. 25	10.21			1.12	1.26						9.47
Aug. 30	12.24				1.43						10.21
Aug. 31	7.29			1.17	1.31	1.45					7.29
Means		(0.94)		1.11	1.15	1.37 (1.24)					
Departures		+0.10	+0.06	-0.04	+0.06	+0.17					

Lincoln, Nebr.

Aug. 1	16.79		0.80	0.92	1.09	1.34	1.08				18.59
Aug. 2	16.79		0.81	0.94	1.10						18.59
Aug. 4	14.10		0.68	0.78	0.90						14.10
Aug. 6	16.20		0.71	0.88							17.96
Aug. 7	16.20					1.37	1.13	0.94	0.82	0.70	14.10
Aug. 8	15.11		0.87	0.96	1.14	1.29	1.02				17.37
Aug. 9	17.96	0.71	0.83	0.90	1.10	1.35					15.11
Aug. 10	16.79		0.59	0.81	0.97	1.19					17.96
Aug. 13	17.37	0.63	0.64	0.79	1.00	1.28					17.96
Aug. 15	17.37				0.89	1.12					16.20
Aug. 20	16.20				1.20	1.01					17.37
Aug. 21	12.24			0.99	1.18	1.29					10.59
Aug. 23	15.65							1.01	0.87	0.78	10.21
Aug. 24	6.50				1.32	1.46	1.28	1.12	0.99	0.89	6.02
Aug. 25	8.51	0.85	0.94	1.04	1.22	1.34					10.59
Aug. 27	13.13				1.33	1.04	0.80	0.70	0.60	0.60	14.60
Aug. 29	16.79				1.21	1.12	1.04	0.96	0.84	0.84	18.59
Aug. 30	8.18		0.98	1.14	1.26	1.39	1.14	0.95	0.82	0.71	10.59
Means		0.70	0.78	0.92	1.10	1.30	1.10	0.98	0.86	0.75	
Departures		+0.04	+0.00	+0.02	+0.02	+0.00	+0.03	+0.09	+0.10	+0.05	

1 Extrapolated.

TABLE 2.—Solar and sky radiation received on a horizontal surface (Gram-calories per square centimeter of horizontal surface)

Week beginning—	Average daily radiation						Average daily departure from normal		
	Washington	Madison	Lincoln	Chicago	New York	Twin Falls	Washington	Madison	Lincoln
1928									
July 30	cal. 469	cal. 373	cal. 470	cal. 299	cal. 399	cal. 637	cal. +28	cal. -88	cal. -55
Aug. 6	324	554	614	434	203	739	-113	+98	+108
Aug. 13	423	500	500	411	373	753	-2	+61	+13
Aug. 20	383	424	524	332	222	666	-22	-11	+28
Aug. 27	376	402	450	344	307	677	-37	-6	-5
Deficiency since first of year on Sept. 2							-800	-319	-1,766

POSITIONS AND AREAS OF SUN SPOTS

[Communicated by Capt. C. S. Freeman, Superintendent U. S. Naval Observatory]

[Data furnished by Naval Observatory, in cooperation with Harvard, Yerkes, and Mount Wilson Observatories]

[The differences of longitude are measured from central meridian, positive west. The north latitudes are plus. Areas are corrected for foreshortening and are expressed in millionths of sun's visible hemisphere. The total area, including spots and groups, is given for each day in the last column]

Date	Eastern standard civil time	Heliographic			Area		Total area for each day
		Diff. long.	Longitude	Latitude	Spot	Group	
1928							
Aug. 1 (Naval Observatory)	H. m. 11 48	° -82.0	° 48.4	° +5.5	123		
		-30.0	98.4	+7.0		139	
		-30.0	98.4	-25.5	31		
		-24.5	103.9	-17.0		93	
		-18.5	109.9	+10.5		46	
		+7.0	135.4	+14.0		340	
		+14.0	142.4	+13.5		432	
		+17.5	145.9	-20.0		31	
		+23.5	151.9	-20.0	22		
		+38.5	166.9	+6.0	31		
		+44.5	172.9	+5.5		62	
		+79.0	207.4	+13.5	123		1,473
Aug. 2 (Naval Observatory)	12 6	-75.5	39.5	+8.5	309		
		-68.0	47.0	+5.5	108		
		-41.0	74.0	-3.5	31		
		-20.0	95.0	+6.0	22		
		-18.0	97.0	-25.5	15		
		-15.5	99.5	+7.5		154	
		-11.0	104.0	-17.5		154	
		-3.0	112.0	+10.5	31		
		+22.5	137.5	+13.5		309	
		+28.0	143.0	+13.0	370		
		+38.0	153.0	-20.0	22		
		+57.5	172.5	+5.5		93	1,618
Aug. 3 (Naval Observatory)	11 29	-62.5	39.6	+8.5	340		
		-55.0	47.1	+5.5	62		
		-29.0	73.1	-3.5		46	
		-5.5	96.6	-25.5	9		
		-1.0	101.1	+8.0		154	
		+2.0	104.1	-17.0		123	
		+10.0	112.1	+10.5	15		
		+33.0	135.1	+14.5		154	
		+40.0	142.1	-19.5		93	
		+41.0	143.1	+13.0	370		
		+70.0	172.1	+5.0		62	1,428
Aug. 4 (Naval Observatory)	11 3	-75.0	14.1	+14.5	46		
		-73.5	15.6	-14.0		62	
		-65.5	23.6	-13.5	31		
		-49.5	39.6	+8.5	247		
		-42.0	47.1	+5.5	40		
		-40.5	48.6	-11.0	6		
		-16.0	73.1	-3.5		46	
		+11.0	100.1	+8.0		154	
		+15.0	104.1	-17.0		46	
		+22.0	111.1	+10.5		18	
		+47.0	136.1	+14.0		123	
		+52.5	141.6	-18.5		62	
		+53.5	142.6	+13.0	370		1,251
Aug. 5 (Naval Observatory)	11 29	-61.5	14.1	+14.5	31		
		-60.0	15.6	-15.0		46	
		-54.0	21.6	-14.0		77	
		-36.0	39.6	+8.5	247		
		-27.5	48.1	+5.5	40		
		+27.0	102.6	+7.5		93	
		+38.5	114.1	+10.0	9		
		+62.0	137.6	-14.0		123	
		+69.5	145.1	+13.0	340		1,006